Ordering number : EN1210E

Monolithic Digital IC

LB1620

3-Phase DD Motor Driver

Overview

The LB1620 is a 3-phase DD motor driver IC especially suited for use in VCR capstan motor drive, drum motor drive, and floppy disk motor drive applications.

Functions and Features

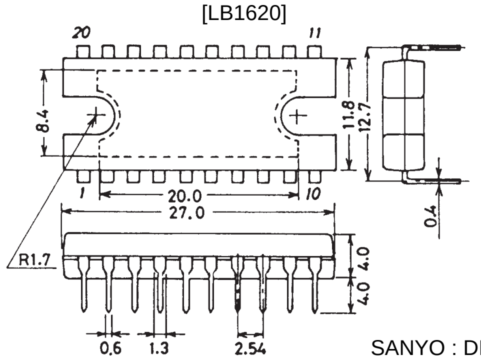
- 3-phase motor driver.
- Capable of controlling drive current.
- On-chip 3-phase control signal generator.
- Phase/speed control pin.
- Forward/reverse rotation control pin.
- Applicable to β/VHS, NTSC/PAL/SECAM.

Package Dimensions

unit: mm

3037A-DIP20H

[LB1620]



SANYO : DIP20H

Specifications

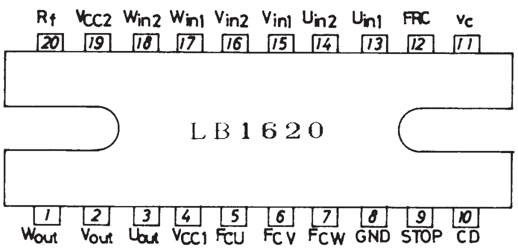
Maximum Ratings at Ta=25°C

Parameter	Symbol	Conditions	Ratings	Unit
Maximum supply voltage	$V_{CC}1$		28	V
	$V_{CC}2$		14	V
Maximum load current	I_L		1.5	A
Allowable power dissipation	Pd max	Ideal heat dissipation	15	W
		Without heat sink	3	W
Operating temperature	Topr		–20 to +75	°C
Storage temperature	Tstg		–55 to +150	°C

Allowable Operating Condition at Ta=25°C

Parameter	Symbol	Conditions	Ratings	Unit
Supply voltage	$V_{CC}1$		8.5 to 26.4	V
	$V_{CC}2$		8.5 to 14.0	V

Pin Assignment



Top view

Electrical Characteristics at Ta=25°C, $V_{CC}1$=12V, $V_{CC}2$=9V

Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
Current drain	I_{CC} off	Vc=0V, Vstop=2V, $I_{CC}1+I_{CC}2$		12	18	mA
	I_{CC} dri	Vc=7V, Vstop=2V, $I_{CC}1+I_{CC}2$		22	40	mA
Saturation voltage	V_O(sat)1	I_O=0.58A, $V_{CC}1$=9.6V, $V_O$sink+$V_O$source			2.1	V
	V_O(sat)2	I_O=1A, $V_{CC}1$=18V, $V_O$sink+$V_O$source			5.0	V
In-phase voltage range			2.0		$V_{CC}2$–2.5	V
Motor forward rotation input voltage range			2.0		$V_{CC}2$	V
Motor reverse rotation input voltage range			0		0.3	V
Interphase current variation		Driver stage	–25	0	+25	%
		Output stage	–25	0	+25	%
Speed control voltage (off)	Vc1	R_f=0Ω, R_S=0Ω, FC pin→GND current=5µA			4.0	V
Speed control voltage (on)	Vc2	R_f=0Ω, R_S=0Ω, FC pin→GND current=0.5mA	4.5			V
	Vc3	R_f=1Ω, R_S=100Ω, V_{Rf}=100mV		4.6		V
Closed loop voltage gain		R_f=1Ω, R_S=100Ω, I_L=100mA		0.44		A/V
Input sensitivity				20		mV

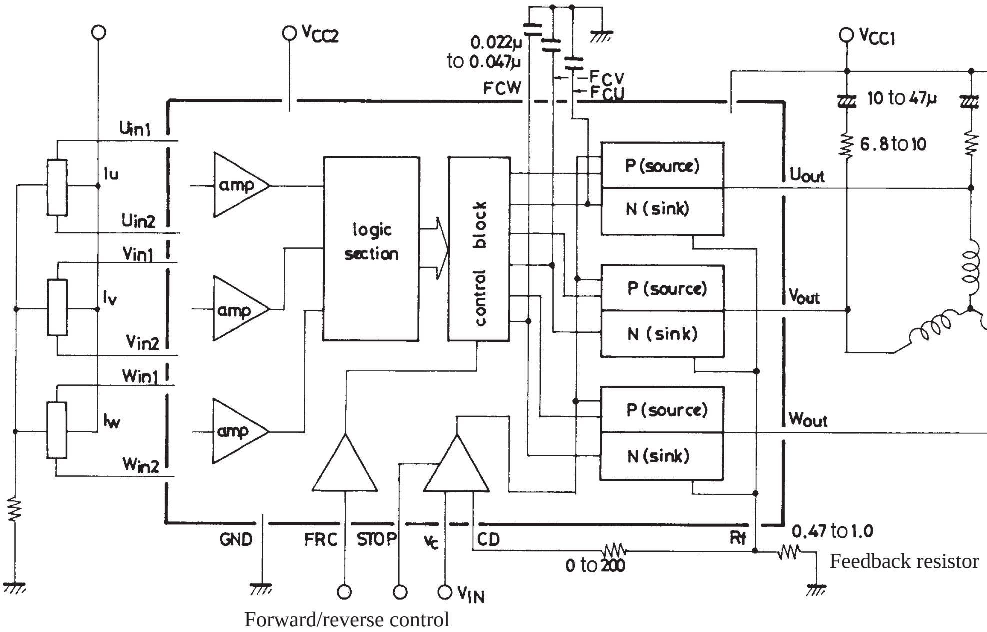
LB1620 Truth Table

	Source / Sink	Input U	Input V	Input W	Forward/Reverse Control (FRC)
1	W phase → V phase	H	H	L	L
	V phase → W phase				H
2	W phase → U phase	H	L	L	L
	U phase → W phase				H
3	V phase → W phase	L	L	H	L
	W phase → V phase				H
4	U phase → V phase	L	H	L	L
	V phase → U phase				H
5	V phase → U phase	H	L	H	L
	U phase → V phase				H
6	U phase → W phase	L	H	H	L
	W phase → U phase				H

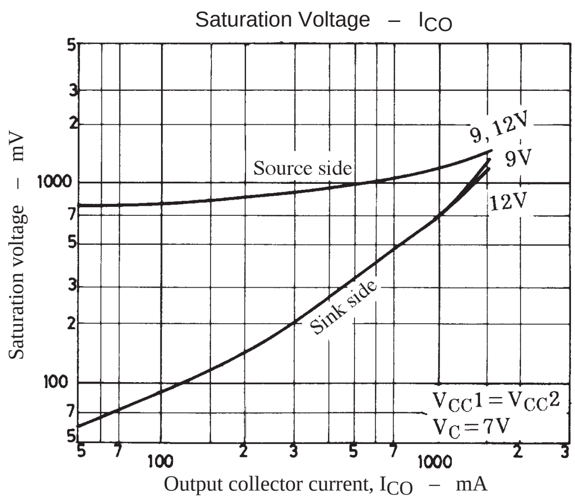
Input : "H" : Each phase input (1) is more than 0.2V higher than each phase input (2).
"L" : Each phase input (1) is more than 0.2V lower than each phase input (2).

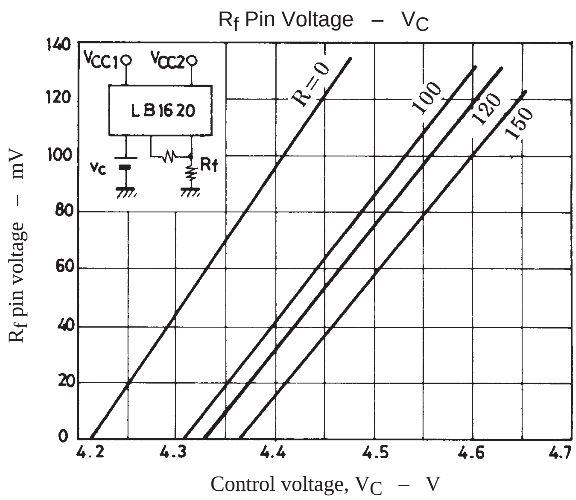
Forward/reverse control : "H" : 2.0 to $V_{CC}2$
: "L" : 0 to 0.3V

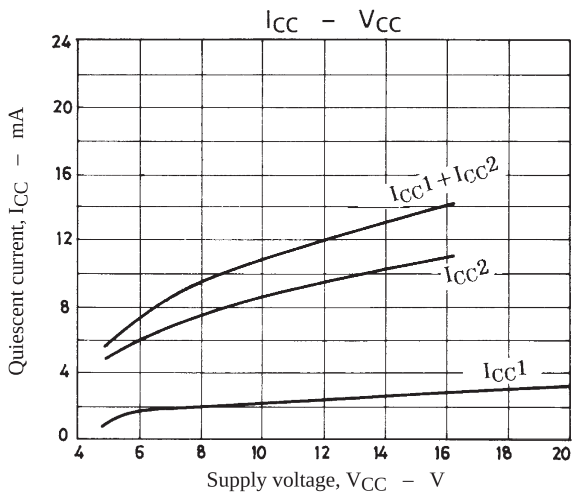
Equivalent Circuit Block Diagram and Peripheral Circuit

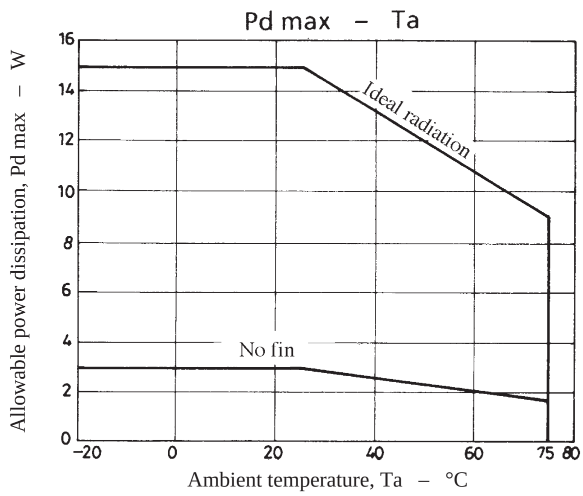


Unit (resistance : Ω, capacitance : F)





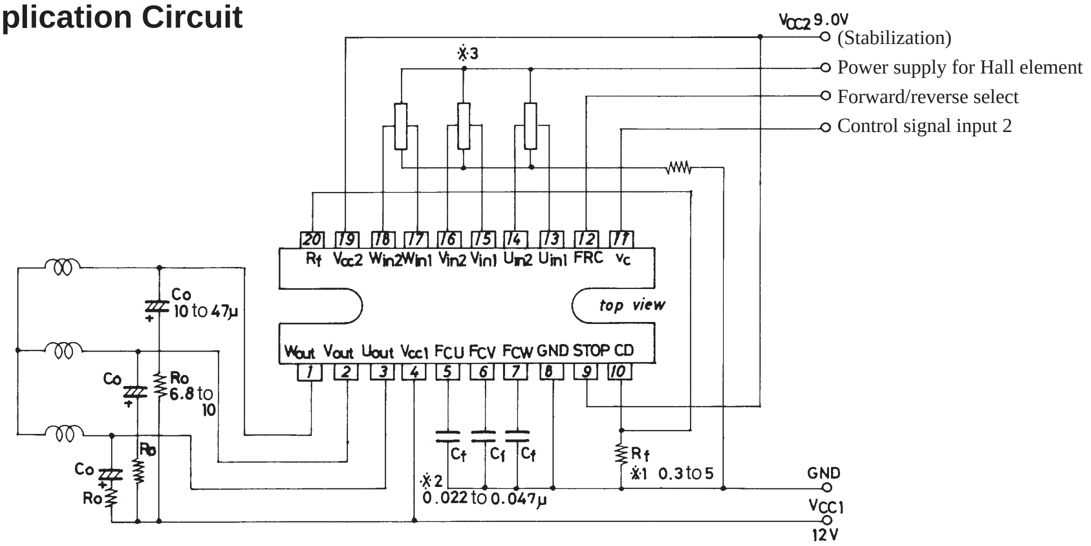




Pin Description

Pin name	Pin No.	Function
$U_{IN}1$, $U_{IN}2$ $V_{IN}1$, $V_{IN}2$ $W_{IN}1$, $W_{IN}2$	13, 14 15, 16 17, 18	U phase Hall element input pin, "H" of logic : $V_{IN}1>V_{IN}2$ V phase Hall element input pin, "H" of logic : $V_{IN}1>V_{IN}2$ W phase Hall element input pin, "H" of logic : $V_{IN}1>V_{IN}2$
U_{OUT} V_{OUT} W_{OUT}	3 2 1	U phase output pin V phase output pin W phase output pin
$V_{CC}1$	4	Power supply pin for applying output
$V_{CC}2$	19	Power supply pin for applying voltage to each section other than output section. The control point of control voltage is at approximately 1/2 of this voltage. This voltage must be stabilized to be free from ripple, noise, etc.
R_f	20	Output current detect pin. By connecting R_f across this pin and GND pin, output current is detected as voltage.
C_D	10	Pin for fetching current (voltage) detected with R_f. By connecting a resistor across C_D pin and R_f, speed control start voltage can be fine-adjusted.
STOP	9	Overcurrent protection pin. Voltage being lower than that on C_D pin is taken to be identical to overcurrent flow, causing output to be cut off. Off-state is held. For example, if STOP pin is set to 1.5V for R_f=1Ω, approximately 1.5A or more flows at output, causing output to be cut off.
F_{CU} F_{CV} F_{CW}	5 6 7	Frequency characteristic compensation pin. Closed loop oscillation in current-controlled system (including motor, F/V converter) is stopped.
V_C	11	Speed/phase control pin. Control starts at approximately 1/2 of $V_{CC}2$. Control is of current-controlled type that controls output current. For R_f=1Ω, LB1620 closed loop has gm of 0.44A/V typ, which can be adjusted by varying R_f.
GND	8	GND for other than output. Minimun potential of output transistor is at R_f pin.
F/RC	12	Forward/reverse rotation control pin. By setting this pin to "H" (more than 2V) / "L" (less than 0.3V), truth value is changed to perform forward/reverse rotation.

Sample Application Circuit



Unit (resistance : Ω, capacitance : F)

Notes on Sample Application Circuit

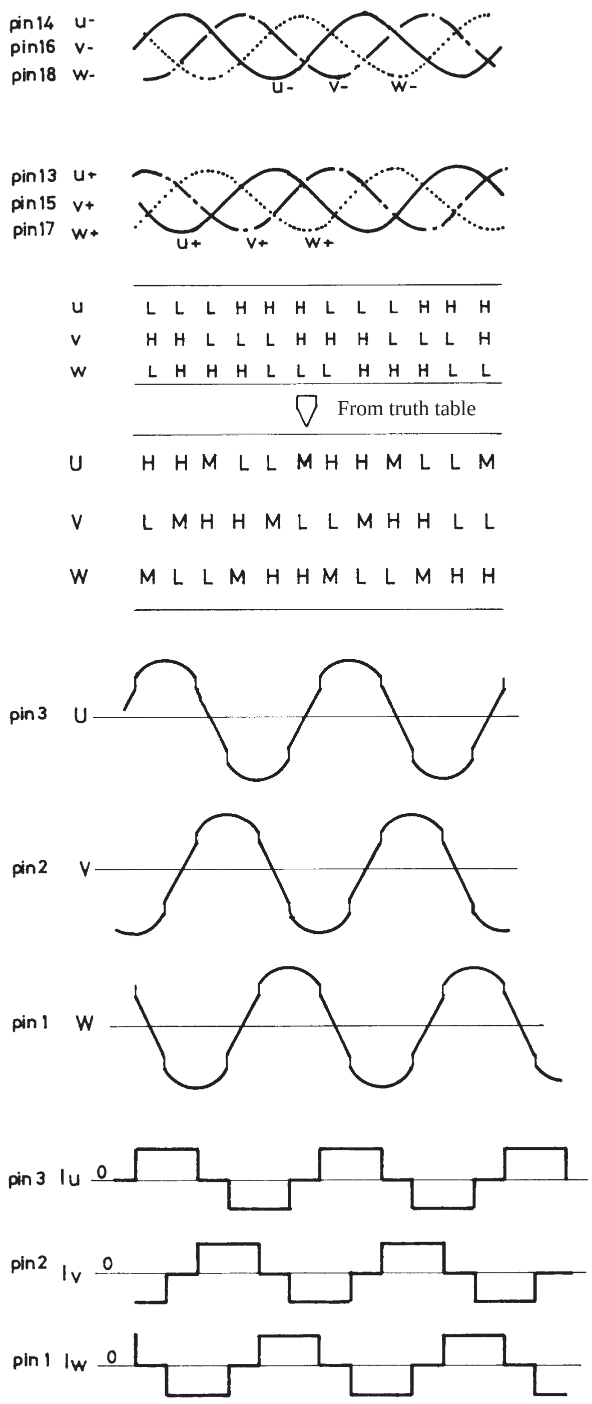
*1. R_f is determined by starting torque required for coil impedance F/V conversion voltage (control input). R_f should be 0.3Ω to 5Ω.

*2. C_f is for stopping oscillation and is determined by motor characteristic and F/V converter-included closed loop characteristic. C_f should be 0.022μF to 0.047μF.

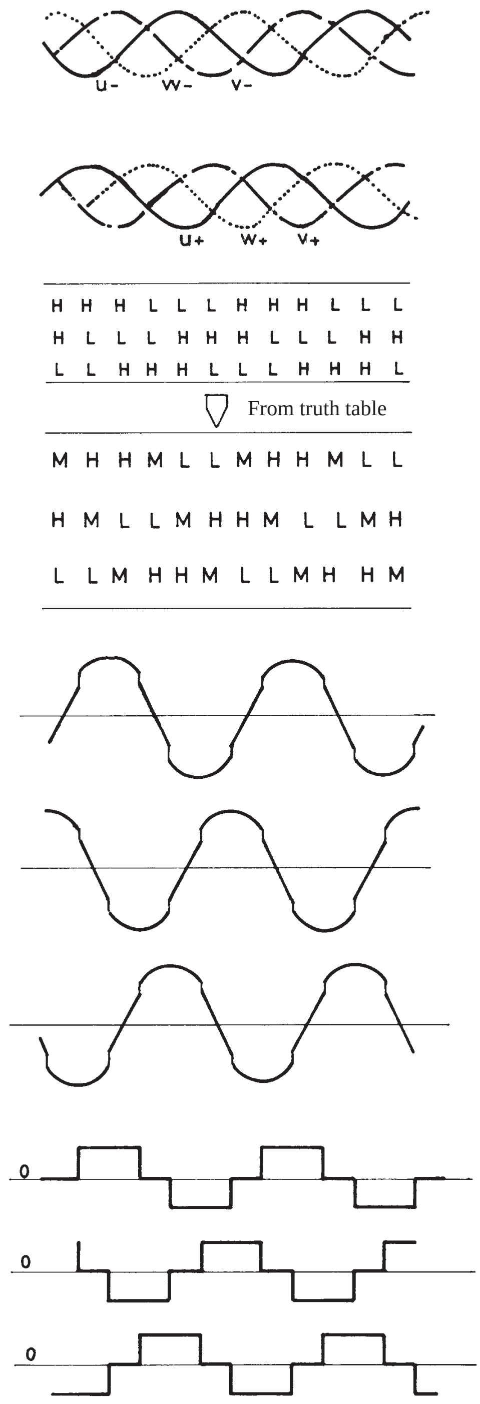
*3. For how to connect Hall element, either parallel connection or series connection is available as long as input voltage is within the range specified.

Timing Chart

Forward/reverse control "L" pin 12



Forward/reverse control "H" pin 12



This catalog provides information as of October, 1997. Specifications and information herein are subject to change without notice.